

Appendix C

Oil and Gas

Introduction

This appendix has been prepared to provide the reader a better understanding of the oil and gas leasing and development process and of the methodology used to evaluate resource potential. In addition, an assessment of reasonably foreseeable development is provided, and lease stipulations are presented.

Leasing and Development

This section first describes BLM Standard Management of the leasing process and then describes the typical operations and BLM Standard Management for each phase of the exploration and development process, including geophysical, drilling and production operations and, finally, well-site abandonment and reclamation. This should be viewed as a general overview and not as a detailed statement of regulatory requirements.

Standard Management of Leasing

Prior to any drilling operations, the property must be leased. BLM administers the leasing of onshore oil and gas on public domain and acquired lands. Onshore oil and gas leasing for most public domain and acquired lands is authorized under the Mineral Leasing Act of 1920 and the Mineral Leasing Act for Acquired lands of August 7, 1947. Certain lands are excluded from leasing under these Acts for a variety of reasons including environmental conflicts, national defense, or authority granted under other acts. Exclusions that are applicable in the planning area include, but are not limited to, the following:

(a) National parks and monuments;

(b) Indian reservations (public domain only);

(c) Incorporated cities, towns and villages;

(d) Tidelands or submerged coastal lands within the continental shelf adjacent, or littoral to lands within the jurisdiction of the United States (acquired lands only); or,

(e) Lands acquired by the United States by foreclosure, or otherwise for resale.

Where oil or gas is being drained from lands otherwise unavailable for leasing, there is implied authority in the agency having jurisdiction of those lands to grant authority to the Bureau of Land Management to lease such lands (see 43 U.S.C. 1457; also Attorney General's Opinion of April 2, 1941 (Vol. 40 Op. Atty. Gen. 41).

All lands must be exposed to competitive lease sales for a legislated minimum \$2.00 per acre bid. Lands which do not receive competitive bids are available for non-competitive leasing for a period not to exceed two years. Parcel size may not exceed 2,560 acres. The lease term is 10 years. Royalty rate is 12 1/2 percent for both competitive and non-competitive leases, and rental is \$1.50 per acre for the first five years, and \$2.00 per acre thereafter for all leases.

Sales are held on a quarterly basis, and public notice is provided 45 days prior to offering lands for lease. Leases may not be issued, or assignments approved, to parties who have failed to properly reclaim a leasehold.

A lessee has a right to use the leased lands, as necessary, to explore for, drill for, extract, remove, and dispose of all the leased resources in a leasehold. This right is subject to stipulations

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attached to the lease, restrictions derived from specific, non-discretionary statutes, and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses, or users not addressed in the lease stipulations at the time operations are proposed. Federal oil and gas leases include standard lease terms many of which are designed to protect other natural resources. Special stipulations are developed on a case-by-case basis to respond to specific environmental concerns for a particular lease area. Special stipulations are developed by the appropriate SMA and BLM through completion of an environmental analysis. Such stipulations limit the lessee's use of the lease. Examples are when portions of the lease cannot be occupied due to resource conflicts, such as the presence of archeological sites, residential areas, threatened or endangered species, or cannot be used during certain times of the year because of wildlife, watershed, conflicting land use, or other concerns. Special stipulations are attached to the lease instrument.

When measures not included in the lease terms are added to an operational permit, they are included as Conditions of Approval. Such conditions are considered consistent with the lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that the operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.

Geophysical Operations

Typical Geophysical Operations

Three subsurface characteristics are usually measured by geophysical methods: gravitational field, magnetic field, and seismic characteristics.

A seismic survey is a method of gathering subsurface geological information by recording impulses from an artificially generated shock wave. The common procedure used in reflection seismic

surveys on land consists of creating shock waves and recording, as a function of time, the resultant seismic energy as it arrives at groups of vibration detectors (1/2- to 5-pound seismometers or jugs) arrayed on the ground at spaced intervals. These arrays of seismometers are connected to a recording truck that receives and records the reflected seismic energy.

The seismic sensors and energy source are located along lines on a 1- to 2-mile grid. Some surveys may be laid out in excess of 40 miles in a series of grid patterns, or in a single line.

Seismic methods are usually referred to by the various methods of generating the shock wave. These include the thumper, vibroseis, dinoseis, and explosive methods.

Historically, explosives have been the most widely used way to generate seismic shock waves. Under this method, a 5- to 20-pound of explosive charge is detonated at the bottom of a 25- to 200-foot drill hole. The hole is usually two to six inches in diameter and is drilled with a truck-mounted rig.

Standard Management of Geophysical Operations

Permitting

BLM has jurisdiction over approval of geophysical operations only on public domain surface. For lands other than public domain, approval is obtained from the land owner or SMA. In the east, very little public domain surface exists. Consequently, requests for approval of geophysical operations are rare. The procedures are addressed in 43 CFR Part 3150 and include the filing of a Notice of Intent to Conduct Oil and Gas Exploration Operations. The completion and signing of the notice signifies agreement to comply with the terms and conditions of the notice. Upon completion of the operation, the applicant shall file a Notice of Completion of Oil and Gas Exploration Operations. Within 30 days after the filing, the applicant will be notified by BLM and advised as

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The initial hole is drilled to a depth of about 100 feet, and a conductor pipe, or casing, is cemented in. A series of blowout preventer (BOP) valves is attached to the well. Drilling is resumed after the installation of casing and BOP valves, using a smaller bit. When the drilling depth reaches several hundred feet, the drill string and bit are pulled out of the hole and surface casing is lowered into the hole, and cemented in. The depth of surface casing depends on the location of underground sources of drinking water, formation pressures, and the tendency of the bore to slough. During the drilling process, the drilling string is pulled from the hole periodically to change the bit, install casing, and/or remove core samples from the well bore. Usually, 90-foot joints made of 30-foot sections are successively lowered into the hole until the final depth is reached.

Drilling operations are continuous, 24 hours a day. Drilling usually lasts 20 to 45 days in the planning area, depending upon well depth and problems encountered. From 5,000 to 15,000 gallons of water a day may be needed for mixing drilling mud, cleaning equipment, cooling engines, and other aspects of the drilling operation. A surface pipeline may be laid to a stream, or a water well, or the water may be trucked to the site from creeks, ponds, or streams in the area.

When total depth of the well is reached one or more of the following completion operations must be conducted in most wells: (1) logging, which indicates porosity, permeability, and saturation of the formation, (2) testing of the formation fluids through the drill stem, (3) installing and perforating the production casing to allow production of the formation, and (4) formation stimulation, which is usually fluid fracture or acid dissolving of the formation to increase the flow capacity of the formation. If producible oil and gas is discovered, the well will be shut-in until production facilities are installed. If producible amounts of oil and gas are not encountered, the well will be plugged and abandoned.

Standard Management of Drilling Operations

Permitting

Onshore oil and gas operations are subject to Federal regulations contained in Title 43 CFR Part 3160, "Onshore Oil and Gas Operations." After lease issuance, and prior to approval of any drilling activities within the area of the lease, the operator must submit an Application for Permit to Drill (APD) as required by Onshore Oil and Gas Order No. 1. The APD provides operational and geologic information as well as the applicant's proposal for use of the surface. Bonding coverage must be obtained by the applicant before approval.

The applicant's proposal for use of the surface is provided in the APD as a Surface Use Program. This program provides a detailed description of the existing roads, proposed access road location and design, location of existing wells, proposed production facilities, water supply, construction materials, waste disposal, ancillary facilities, well site layout, plans for surface reclamation, surface ownership, lessee's or operators representative, and any other additional information that may be helpful in processing the APD. Where private surface is involved, the program includes a copy of the written agreement between the lessee, or operator, and the surface owner.

A field inspection of the proposed drill site and access road is conducted by BLM and other interested parties. Other participants normally attending the inspection include the SMA for federal surface, the appropriate state agency on state lands, the surface owner on private lands, the operator, drilling contractor, dirt contractor, and any other interested parties. From this effort, site-specific requirements are formulated for the protection of affected resources. Although BLM has primary responsibility, it must have concurrence from any other SMA.

The environmental impacts of the proposed drilling operation are assessed through the preparation of an appropriate environmental document. As part of the review process, state and federal

agencies possessing special expertise in the management of a particular resource are consulted in order to obtain their advice as to the impact of the proposal to a specific resource. Examples of agencies consulted include the USFWS, concerning threatened or endangered species, and the SHPO, concerning cultural resources.

Best Management Practices

Well Site. Well sites should be located on the most level location available that will accommodate the intended use. The site layout should be oriented to conform to the best topographic situation, given the geologic target and any safety considerations. However, safety considerations may be an overruling factor (such as operations in a hydrogen sulfide area). Steeply sloping locations which require deep, nearly vertical cuts and steep fill slopes should be avoided. Generally, cut-and-fill slopes on the perimeter of the well pad are not to exceed 3:1 (three-foot horizontal for each one foot vertical). The location of the well site should also be selected considering the effect upon the location of the access road. Advantages gained on a good well site or tank battery location may be negated by adverse effects of the access road location.

Construction must conform to the approved surface-use program. Generally, all topsoil shall be removed from the entire construction site, including the fill area, and stockpiled. The depth of topsoil to be stripped and stockpiled should be determined at the pre-drill inspection, and/or stated in the proposed surface-use plan. Soil stockpiles should be located to avoid mixing with subsurface materials during construction and reclamation. Stockpiles should be located so wind and water erosion are minimized.

Fills should be compacted to minimize the chance of slope failure. If appropriate, terraces can be used on cut-and-fill slopes to reduce land impacts and to prevent excessive water accumulation and erosion. If excess cut material exists after fill areas have been brought to grade, the excess material may be disposed of or stockpiled at approved locations.

The area of the well pad that supports the drilling rig substructure must be level, and capable of supporting the rig. Ideally, the rig should be located on cut material. The drill rig is not to be placed on uncompacted fill material. Runoff water from off-site areas should be diverted away from the well site by ditches, waterbars, or terraces above the cut slopes.

The reserve pit should be located in cut material. On steep slopes, this may not be entirely possible. In such cases, at least 50 percent of the reserve pit should be constructed below original ground level to prevent failure of the pit dike. Fill dikes must be compacted. The necessary degree of compaction depends on soil texture and moisture content.

It may be necessary to line reserve pits to inhibit seepage. A synthetic liner should consist of a reinforced polymer type with a minimum thickness of 10 millimeters. Compacted native clay and bentonite is also commonly used. The thickness of the clay/bentonite should be determined on a site-specific basis, but is generally one to two feet. In some areas, a closed mud system may be required.

Access Roads. Drainage must be provided for the entire road. Usually this is accomplished by use of drainage ditches and culverts.

Normal road gradients should not exceed 8 percent.

Culverts are used in two applications on access roads: (1) in streams and gullies to allow normal drainage to flow under the traveled way, and (2) to drain inside road ditches. All culverts should be laid on natural ground, or at the original elevation of any drainage crossed. Culverts should be placed on a 3 percent minimum grade. The outlet of all culverts should extend at least one foot beyond the toe of any slope.

Wetlands are especially sensitive areas. Generally, these areas require crossings which prevent unnatural fluctuations in water level. Marshy and swampy terrain may contain bodies of water with no discernible current. The design of culverts for

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roads crossing these locations requires some unique considerations. The culvert should be designed with nearly a flat grade so water can flow either way and maintain its natural water level on both sides. It may be partially blocked by aquatic growth, and installed with the flow line below the standing water level at its lowest elevation. Special attention must be given to the selection of culvert materials that will resist corrosion.

In some cases drainage crossing can be effectively accomplished by dipping the road down to the bed of the drainage. Material moved from the banks of the crossing should be stockpiled near the right-of-way. Gravel, riprap, or concrete bottoms may be required in some situations. In no case should the drainage be filled so that water will be impounded.

Production Operations

Typical Production Operations

After reaching the desired depth and determining that the well has tapped sufficient reserves to be economically developed, the well is completed. First, casing strings are cemented into the hole. A number of log tests, such as cement bond logs and temperature logs, may be run to determine the quality of the cement job. Operators use perforating guns to perforate the casing downhole. A perforating gun is lowered into the hole on a conductor cable by wireline until it reaches the depth of the pay zone or zone to be perforated. The perforating gun is then fired, penetrating the casing with bullets fired from the gun and creating channels from the formation to the well bore. Then the production tubing strings are set inside the casing to let the pay-zone fluids enter the cemented casing strings. A well may be completed with single completion (completion in one formation), multiple completion (completed in separate formations at the same time with separate production equipment for each formation); or commingled completion (completed in more than one formation at the same time using a common production system).

In some cases, after a well is completed, the formation does not show a promising amount of petroleum products as indicated on a well log or core samples. Operators use a variety of well-stimulation techniques to correct these problems during the development phases of the well. The two most often used techniques for stimulating a well are acidizing and fracturing. Fracturing increases the permeability of the formation in the area of the well bore and increases local pore size. Acidizing dissolves waxes, carbonates, and other materials clogging the area near the bore. Hydrochloric acid (HCl) is by far the most common used acid.

After wells are drilled and completed, they are ready to be produced. There are several types of recovery methods in production operations. The first is primary recovery, which uses natural flow and artificial lift to get the hydrocarbons to the surface. Most fields initially produce by primary recovery methods, but natural decline rate of wells indicates when workovers or other methods of recovery are needed to maintain or improve production.

Production activities include installation of production equipment and product treatment facilities, flowlines and pipelines, and disposal of produced water. Normally, when compared to gas production, oil production requires more tanks and treatment facilities. In addition, oil production facilities require more maintenance and have a greater potential for spills. In many cases, gas production is dry and does not require the use of tanks.

The oil and/or gas, and in some cases produced water, is transported to the production facilities through flowlines typically two to four inches in diameter. Flowlines may or may not be buried.

Production equipment which may be installed includes pumping units, tanks, dehydrators, separators, and meters. Tank batteries are used to store produced oil or condensate prior to sale, or produced water, prior to disposal. The tank battery and other treatment equipment is normally located on the well pad, or adjacent to the access

road. In developed fields, a centrally located facility may be used. A typical tank battery consists of two 200-barrel tanks for produced oil and one 200-barrel tank for produced water. These tanks are normally enclosed by a firewall designed to contain the fluids in the event of a spill.

Produced fluid at the wellhead is a complex mixture of gas, oil, water, and other impurities (such as sand and scale). A series of gravitational, chemical, and thermal treatment steps may be used to separate marketable gas and crude oil from the produced water and sand. Dehydrators and separators are used to separate the various petroleum products and remove water. This facility is typically located 150 feet from the well and tank battery.

Produced water is often high in chloride content. The water must be disposed according to federal and state standards. In most cases, the water is removed from the site and is disposed into the subsurface by an injection well.

Once treated, the oil is sold and removed either by truck or pipeline. Meters are used to measure the amount of gas produced before it is put into a transmission pipeline.

Pipelines transport oil or gas from the wells or production facility to a trunk line and then to the main transmission line from the area. Trunk lines are generally six to eight inches in diameter and are buried, as are transmission lines which vary in diameter from 10 to 36 inches. The area required to construct a flowline or pipeline varies from about 15 feet wide for a two- to four-inch surface line to 75 feet or more for transmission lines 24 to 36 inches in diameter. Surface disturbance is primarily dependent on size of the line and topography.

The first step in pipeline construction is to clear the right-of-way of any obstacles along the route such as vegetation, rocks, and abrupt surface irregularities. Next, topsoil over the trench location is removed and stockpiled on the side of the trench away from the working side of the

trench. Then trenchers or backhoes dig the trench in which the pipe will be laid. The ditch must be deep enough to allow three to five feet of cover over the pipeline. Fill excavated from the trench can be placed on either side of the trench taking care not to mix it with any topsoil that may be stockpiled.

After the trench is ready, the pipe is laid along the open trench in separate lengths. The lengths of pipe are positioned for welding together either by hand or side boom tractor.

The welds are inspected, pipe is cleaned, coated with tar, covered with fiberglass, and finally wrapped with tar paper, kraft paper, or asbestos felt. The pipe is then lowered into the ditch which is backfilled and compacted. The right-of-way is regraded to the original contour, and the topsoil is replaced. Compressor stations may be necessary to increase production pressure to the same level as pipeline pressure.

Standard Management of Production Operations

Permitting

The method used to approve operations and the installation of facilities subsequent to drilling depends on whether or not the facility is part of the leasehold operation. All facilities used for production, treatment, and transmission of oil and gas are considered leasehold facilities to the point where the product is sold. This includes facilities that are off-lease and authorized under an off-lease storage permit. Such facilities include storage tanks and processing facilities, sales facilities, all pipelines upstream from such facilities, and other facilities to aid production, such as water disposal lines and gas or water injection lines.

When such facilities require new construction, reconstruction, or alteration and surface disturbance will result, the proposal for installation of such facilities is subject to the same type of environmental review process used prior to drilling.

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Pipelines and other facilities beyond the point-of-sale must be approved by right-of-way permits, special-use permits, or permission of the land owner. BLM has approval authority over this category of facilities only on public domain surface. Such approvals are granted according to 43 CFR Part 2880.

Best Management Practices for Production Operations

All areas not needed for production purposes must be reclaimed in accordance with BLM and the SMA specifications. The locations selected for facilities such as tank batteries, pits, and pumping stations should be planned so as to minimize long-term disruption of the surface resources. Construction techniques and other practices should be employed that would minimize surface disturbance and effects on other resources, and maintain the reclamation potential of the site.

BLM regulations require that various equipment be used for safety purposes. This includes belt guards and guard rails on the pumping unit. Some of the design and operating standards for production operations required by the Jackson District are as follows:

All tanks must be enclosed with a firewall capable of containing 1 1/2 times the contents of the largest tank in the battery. Any crossing into the firewall must use a structure such as a small platform to prevent the wall from eroding.

In some cases, devices such as automatic shut down switches on production equipment or sump pumps within the tank battery firewall may be required to prevent spills.

Devices used to drain the area within the firewall, such as pipes, drains, siphon hoses, pumps, or the cutting of the wall, are prohibited. Any fluids contained within the firewall must be disposed in a manner specified by BLM.

Flowlines should be placed adjacent to the access road as much as possible. This reduces the impact to other areas, reduces the chance that

such lines will be accidentally cut by other activities, and provides a better means to monitor the lines for leaks.

Clamps may be used on steel flowlines to repair leaks, but may be used only as a temporary measure not to exceed 30 days.

Evaporation pits for disposal of produced water are not permitted.

Well Abandonment and Reclamation

Typical Abandonment and Reclamation

Well plugging and abandonment requirements vary with the rock formations, subsurface water, well depth, and other factors. Generally, however, the area below the surface casing is filled with heavy drilling mud, and cement plugs are installed at various points to protect aquifers and known oil and gas producing formations. In instances where the casing has not previously been cemented to the surface, operators may recover the casing prior to plugging the well. In such instances, the casing string may be cut above the last cemented zone, with cement used to plug the remaining casing below. Recovered casing may be used at other operations. In cases of production wells that are no longer economical, tubing and liners are pulled out of the well after the well-head assembly is removed. Cement plugs may be installed above and below fresh-water aquifers, and across all perforated zones. A final cement plug is set all the way to the surface, and finally, a concrete slab is placed on top of the cement plug at or below the ground.

A pipe monument giving the location and name of the well is required unless waived. If waived, the casing may be cut off below ground level.

Reclamation is normally initiated at two stages. Should a well be placed in production, the areas not needed for production must be reclaimed. If the well is dry or when the well is depleted, then abandonment and final reclamation is required.

A reclamation plan is part of the surface-use program of operations. Dry holes are immediately plugged following testing of the well. In most cases, wells that produce are plugged as soon as they are depleted. In some cases, depleted wells are not plugged immediately but are allowed to stand idle for possible later use in a secondary recovery program or other uses such as conversion to a disposal well. Surface flowlines and production equipment are removed.

One of the initial steps of drill site restoration is disposal of the mud. The drilling mud is normally disposed by one or more methods. Depending on the method used, this may occur before or after the plugging of the well. One method used prior to plugging is pumping the mud down the well. In the case of a dry hole, the mud is pumped directly through the surface casing. For a producing well, the mud is pumped behind the production casing. Another method consists of evaporation and burial of the mud on site. This may require spreading or trenching of the mud to promote rapid drying. Another method consists of off-site disposal in a commercial pit or surface discharge.

After plugging, the well pad, reserve pit, and access road are restored. This may include the use of dozers, graders, and backhoes to recontour the disturbed areas. This is typically followed by application of seed, fertilizer, and mulch.

Standard Management of Abandonment and Reclamation

Permitting

Well abandonment operations may not be started without prior approval of the BLM. The operator is required to submit a "Sundry Notices and Reports on Wells," Form 3160-5. The Sundry Notice serves as the operator's Notice of Intention of Abandonment. In the case of newly drilled dry holes or failures, and in emergency situations, oral approval may be obtained from the authorized officer subject to written confirmation by application. Abandonment will not be considered concluded until surface rehabilitation work, as re-

quired by the drilling and/or abandonment approval, is completed. The bond is retained by BLM until all requirements in the approvals are met.

Best Management Practices for Abandonment and Reclamation

All pits must be reclaimed to a condition similar to the rest of the reclaimed pad area. In addition, the reclaimed pit must be restored to a safe and stable condition. Pits are not to be filled while still containing fluids. The contents must be dry, or removed prior to filling. The pit area should be mounded to allow for settling. The mounding will also allow for positive surface drainage off the reclaimed pit. All other excavation or drill holes must be closed by backfilling once dry and graded to conform to the surrounding terrain.

Site preparation prior to seeding may include ripping, scarifying, contour furrowing, terracing, reduction of steep cut-and-fill slopes, water-barring, and/or other methods. The disturbed sites should be prepared to provide a seedbed for re-establishment of desirable vegetation and reshaped to blend with the natural contour.

Disturbed areas must be revegetated after the site has been satisfactorily prepared.

The operator will be advised as to species, methods of revegetation, and seasons to plant.

Seeding should be done by drilling on the contour whenever practical. Seeding and/or planting should be repeated until satisfactory revegetation is accomplished, as determined by BLM or the SMA. Mulching, fertilizing, tree planting, fencing, or other practices may be required.

For all activities, which alter landforms, disturb vegetation, or require temporary or permanent structures, the operator may be required to comply with visual resource management objectives for the area.

Reclamation and abandonment of pipelines and flowlines may involve replacing fill in the original cuts, reducing and grading cut-and-fill slopes to

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conform to the adjacent terrain, replacement of surface soil material, waterbarring, and revegetating in accordance with normal rehabilitation practices.

Resource Evaluation

All of Florida is considered to be prospective for oil and gas. Thus Florida has been classified into high, moderate, and low areas of potential for oil and gas reserves. These are defined as:

High: Inclusion in an oil and gas play as defined by the USGS national assessment, or, in the absence of a play designation by USGS, is the demonstrated existence of: source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, and traps. Demonstrated existence is defined by physical evidence or documentation in the literature.

Moderate: Geophysical or geological indications that the following may be present: source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, and traps.

Geologic indication is defined by geological inference based on indirect evidence.

Low: Specific indications that one or more of the following may not be present: source rock, thermal maturation, or reservoir strata possessing permeability and/or porosity, and traps.

None: Demonstrated absence of source rock, thermal maturation, and reservoir rock that precludes the occurrence of oil and/or gas. Demonstrated absence is defined by physical evidence or documentation in the literature.

Oil and gas potential is illustrated in Map 3.

Reasonably Foreseeable Development

Assumptions and analysis of the reasonably foreseeable fluid mineral development in the project area are outlined below. These assump-

tions are necessary for a meaningful and reasoned analysis of the cumulative impacts resulting from oil and gas leasing and development. The assumptions are based on a statistical analysis of historic development. It was estimated that 10 wells would be drilled on the FMO and 90 wells on private surface and minerals. Of these 100 wells, 6 percent will be successful. In this analysis, the figure 100 wells was used to estimate the cumulative impacts from oil and gas development. If wells are drilled on the FMO, they will be deep zone tests. They will be drilled within the next 10 years in a high potential area, most likely in the Blackwater State Forest.

The following assumptions were used in this analysis:

The average length of access road per well site would be one-third mile.

The maximum width of the access road would be 30 feet.

The average length of a gathering line per well would be approximately one-third mile to existing road or flowline rights-of-way for six of the wells.

Gathering line rights-of-way widths would be less than 30 feet and would be placed in road rights-of-way when possible.

For well pad construction, disturbance would be an average of three acres.

These figures reflect surface disturbance that would result from the expected development (10 wells on FMO and 90 wells on other mineral ownership) in Florida during the 10 years after approval of the RMP. Actual road and pipeline lengths could be longer with remaining portions on other surface. The following chart displays the estimated area of disturbance in acres from drilling.

Number of Wells	Area Disturbed from Drilling (Acres)		
	Well Pads	Access Roads	Total
100	300	121.2	421.2

It is assumed that all wells would be drilled within 10 years. Therefore, surface disturbance associated with exploration for full field development would be spread out over the 10-year period. We expect an average of 10 wells per year to be drilled. The total acreage disturbed will be approximately 421 acres. Of this, approximately 10 percent will occur on federal lands, or 42 acres of disturbance.

The producing well sites (approximately 6 percent of the total wells drilled) will be reduced to a maximum area of 10,000 square feet after the well is put in production. The following chart displays the estimated area disturbed from production.

Number of Wells	Area Disturbed from Production (Acres)			
	Well Pads	Flowlines	Roads	Total
6	1.5	7.2	7.2	15.9

The total acreage disturbed from drilling and production after all wells are drilled will be approximately 428 acres. It should be noted that the total amount of disturbances will not occur at the same time and wells will be abandoned and restored during the 10-year planning period.

Stipulations

Stipulations are added provisions that are attached to and made part of the lease and modify standard lease rights or the manner in which operations may be conducted.

Florida Division of Forestry Stipulations

The following stipulations were developed by the FLDF to be applied to oil and gas leases within the Blackwater River State Forest. These (or very similar) stipulations are attached to most of the existing leases within the Blackwater and will be applied to future leases.

1. No surface occupancy shall be permitted within 300 feet of any creek, stream, river, lake, pond, or wetland. This distance may be increased on a case-by-case basis to assure no impact to a water body or its 100-year flood plain.
2. Surface activities are prohibited within red-cockaded woodpecker colony sites. These are generally 10 acres in size.
3. Surface activities are prohibited within all recreation areas, which includes picnic, day use, and camping areas. Oil well sites are prohibited within 250 feet of these areas. This distance may be increased on a case-by-case basis to assure that any of these areas are not adversely impacted.
4. Surface activities are prohibited from hiking trails and horseback riding trails.
5. Surface activities are prohibited within 250 feet of dwellings and developed areas, such as the headquarters site, certain recreation areas, Munson Nursery, and the Seed Orchard. This distance may be increased on a case-by-case basis to assure that any of these areas are not adversely impacted.
6. Surface activities are prohibited within 250 feet of environmentally sensitive areas, unique natural areas, and known areas of historical significance.
7. Surface activities are prohibited within easement and subleased areas granted to utility and telephone companies, or local government bodies.
8. Surface disturbing activities are prohibited on any road located within the forest boundary. If road degradation is caused by the lessee's equipment, the roads will be repaired immediately by the lessee at lessee's expense. If road improvements need to be made by the lessee, they will be made so that they meet FLDF standards.

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9. Surface disturbing activities may be prohibited from areas where land management activities are taking place, or areas with recently established pine regeneration.
10. Surface activities are prohibited in any area where endangered or threatened species exist or where critical habitat for an endangered or threatened species exists, as determined by the FLDF.
11. Lessee shall work in close cooperation and coordination with the FLDF and no activity of any kind shall be undertaken without prior approval from the FLDF.
12. An oil and gas lessee on Blackwater River State Forest must have both state and federal oil and gas leases for a particular area before conducting any surface activities.
13. An embankment three (3) feet in height will be developed around any oil well site during the initial phase of construction to prevent degradation to the surrounding ecosystem. This embankment will be maintained until the well site is abandoned.
14. Any sites disturbed by a lessee, such as clearing a site for drilling, must have a reclamation plan approved by the FLDF before such disturbance occurs. This plan will require erosion control measures and tree planting. If the FLDF determines that reclamation efforts have failed or are inadequate within a period of five years after the reclamation work has been performed, then the lessee will be required to reclaim the site to the satisfaction of the FLDF.
15. If the lessee requests that merchantable pine timber, as determined by the FLDF, be harvested to accommodate any facilities associated with oil and gas production, lessee will compensate the FLDF for the difference between the salvage price and the current market value of such timber. Under no circumstances are trees to be harvested, damaged and/or destroyed without prior authoriza-

tion from the FLDF. If undesignated live trees are harvested, damaged, and/or destroyed as a result of any operation associated with an oil and gas lease, or if lessee requests timber be removed from any area and does not develop that area, lessee will compensate the FLDF double stumpage based on the market value of such trees, as determined by the FLDF. This would not relieve the lessee from paying possible additional punitive damages.

RMP Stipulations

The stipulations listed below shall be applied, as prescribed in the approved RMP, to future oil and gas leases on both split-estate FMO and BLM surface tracts. If the resources protected by the stipulations would be affected by lease of SMA lands, the same stipulation(s), or similar stipulation(s) developed by the SMA, would be applied.

There are three categories of lease stipulations; no surface occupancy, timing limitation, and controlled surface use, as defined below:

No Surface Occupancy (NSO) - Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values.

Timing Limitation (Seasonal Restriction) - Prohibits surface use during specified time periods to protect identified resource values.

Controlled Surface Use (CSU) - Use and occupancy is allowed, but identified resource values require special constraints on operations.

For each stipulation there are standards for exception, modification, and waiver. An **exception** is a case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria applies. A **modification** is a fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease; a modification may include an exemption from or

alteration to a stipulated requirement and may or may not apply to all other sites within the leasehold to which the restrictive criteria applied. A **waiver** is a permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

No Surface Occupancy Stipulations

Bald eagle

Stipulation: No surface occupancy will be permitted within a 1,500-foot buffer (primary zone) around bald eagle nests and communal roost sites.

Objective: To avoid impacting nesting eagles and to provide protection for important nesting and foraging habitat.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None

Waiver: This stipulation may be waived if no nest site can be identified on or within 1,500 feet of the leased tract or if the applicant can document that the nest site has not been used by bald eagles for five years.

Choctawhatchee beach mouse and Perdido Key beach mouse

Stipulation: No surface occupancy will be permitted within Choctawhatchee beach mouse or Perdido Key beach mouse federally designated critical habitat.

Objective: To avoid impacts to Choctawhatchee beach mouse and Perdido Key beach mouse.

Exception: None

Modification: None

Waiver: None

Coastal strand

Stipulation: No surface occupancy will be permitted in coastal strand habitats.

Objective: To protect this sensitive plant community and the wildlife and plant species associated with it.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None.

Waiver: This stipulation will be waived if coastal strand is not found on the tract.

Florida scrub habitats and associated sensitive species

Stipulation: No surface occupancy will be permitted in Florida scrub habitats (including sand pine scrub and xeric oak scrub).

Objective: To protect rapidly disappearing scrub habitats. These habitats are endemic to Florida and support several federally and state-listed species, as well as several candidates for federal listing and species of special concern in Florida.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None.

Waiver: This stipulation will be waived if scrub habitats are not found on the lease area.

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Longleaf Pine Preservation Area (Blackwater River State Forest)

Stipulation: No surface occupancy is allowed within the 580-acre Longleaf Pine Preservation Area in the Blackwater River State Forest.

Objective: To reduce impacts to this tract of forest, which is being maintained primarily for education and aesthetic purposes.

Exception: None

Modification: None

Waiver: None

Red-cockaded woodpecker

Stipulation: No surface occupancy within one-half mile of a red-cockaded woodpecker cluster, defined as all cavity trees within a 1,500-foot circle.

Objective: To protect red-cockaded woodpecker nest sites from disturbance and habitat degradation.

Exception: An exception may be granted to allow surface occupancy up to within 200 feet of the cluster if the project is completed without removing trees over 30 years old, and the action will not reduce the available forage below the threshold established by the USFWS. An exception may be granted to allow surface occupancy if the operator agrees to implement a mitigation or compensation program. Proposals for exception must be evaluated in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None.

Waiver: This stipulation may be waived if no active colonies are found on the tract or if off-site compensation has been approved by the USFWS and the state of Florida.

Sandhills

Stipulation: No surface occupancy will be permitted in sandhills.

Objective: To protect this sensitive plant community and the wildlife and plant species associated with it.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None.

Waiver: This stipulation will be waived if sandhills are not found on the tract.

Soil and Water

Stipulation: No surface occupancy will be permitted on the following soil mapping units, as delineated on the referenced maps¹:

Coastal Dune Land and Beach-Tidal Marsh
Plummer-Rutledge-Alluvial Land-Fresh Water
Swamp-Dorovan-Pamlico
Salt Water Marsh-Bayvi-Dirego
Lakeland-Paola-Kureb-St. Lucie-Rimini

Objective: To protect soil or water resources in areas not favorable for construction and installation of facilities associated with oil and gas exploration and development. Limiting characteristics include severe wind erosion and rapid permeability along the Gulf barrier chain, and water table at or near the surface for long periods.

Exception: Use of existing roads which does not require modification or improvement is excepted.

Written requests for exceptions to this stipulation will be considered. An exception will be granted if inspection and analysis shows that the limiting characteristics of the stipulated soil mapping units do not exist on a specific site(s), and conditions

are found to be favorable for construction and installation of oil and gas facilities. Exceptions may be granted to allow access road construction across these units when no other reasonable alternate road route is available, and the request for exception includes a road construction plan that outlines methods to avoid significant impacts. Development of such a road plan will include coordination with one or more of the following agencies: COE, USFWS, USSCS, or appropriate state agencies.

Modification: None

Waiver: Written requests for a waiver of this stipulation will be considered. A waiver will be granted if inspection and analysis shows that the limiting characteristics of the stipulated soil mapping units do not exist on the lease, and conditions are found to be favorable for construction and installation of oil and gas facilities.

Tropical hardwood hammock

Stipulation: No surface occupancy will be permitted in tropical hardwood hammocks.

Objective: To protect this rare plant community and the sensitive wildlife and plant species associated with it.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None

Waiver: This stipulation will be waived if tropical hardwood hammocks are not found on the tract.

Wading bird rookeries

Stipulation: No surface occupancy is allowed within 375 feet of wading bird rookeries.

Objective: To reduce impacts to nesting wading birds and protect water quality of adjacent foraging areas.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None

Waiver: This stipulation will be waived if wading bird rookeries are found not to exist on or within 375 feet of the tract.

Wetlands, aquatic habitats and associated sensitive species

Stipulation: No surface occupancy will be allowed within an area identified as a wetland or aquatic habitat or within 550 feet of a wetland or aquatic habitat.

The vegetation or hydrology of a wetland area will not be altered in any way or by any means.

Objective: To minimize the loss, destruction, or degradation of wetlands, to preserve and enhance the natural and beneficial value of wetlands areas, to meet the national direction of "no net loss" of wetlands, and to prevent adverse impacts to federally listed plant and animal species and other sensitive species supported by wetland and aquatic habitats.

Exceptions: Use of existing roads which does not require modification or improvement is excepted.

The authorized officer may grant an exception for occupancy within the 550-foot buffer zone (outside of the area identified as a wetland) if it is determined that the proposed use would not cause adverse impacts to federally listed or other sensitive species.

Exceptions may be granted to allow access road construction across these units when no other reasonable alternate road route is available, and

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the request for exception includes a road construction plan that outlines methods to avoid significant impacts. An exception may be granted to allow surface occupancy in the wetland area if measures can be taken to either prevent or offset adverse impacts to the wetland area, through compensating and/or enhancing or restoring wetlands which have been approved by the authorized officer after coordination with one or more of the following agencies: USFWS, USSCS, USACOE, and state agencies.

Modification: None

Waiver: This stipulation may be waived if no wetlands are found on the tract or within 550 feet of the tract.

Wood stork

Stipulation: No surface occupancy will be permitted at any time within 1,500 feet of wood stork nesting colony site (primary zone) or within 1,000 feet of identified roosting.

Objective: To avoid impacts to nesting wood storks and protect water quality of adjacent foraging areas.

Exception: An exception may be granted if an off-site compensation or on-site mitigation plan has been approved by the USFWS and the FGFWFC.

Modification: None

Waiver: This stipulation will may be waived if no evidence of wood stork nesting or roosting is found on or within 1,500 feet of the tract.

Seasonal Restriction Stipulations

Bald eagle

Stipulation: No surface disturbance will be permitted during the nesting period (October 1 through May 15) in the secondary zone, which encompasses the area within a mile of the primary zone around bald eagle nest sites. No trees suitable for nesting or roosting will be removed

from the secondary zone. Typically, these are the largest trees in a stand with open crowns and stout lateral limbs.

Objective: To protect important foraging habitat, promote nest fidelity and maintain habitat integrity around bald eagle nest sites.

Exception: An exception may be granted if the operator agrees to implement an compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None

Waiver: This stipulation may be waived if no nest site can be identified or if the applicant can document that the nest has not been active for five years.

Wading bird rookeries

Stipulation: No surface occupancy within 900 feet of wading bird rookeries during the breeding season (February through August).

Objective: To reduce impacts to nesting wading birds and protect water quality of adjacent foraging areas.

Exception: An exception may be granted if the operator agrees to implement a mitigation or compensation program which has been developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: None

Waiver: This stipulation will be waived if wading bird rookeries are found not to exist on the tract.

Wood stork

Stipulation: No surface occupancy will be permitted within 1,000 feet of the primary zone around wood stork nesting colony sites during the nesting season.

(Storks require approximately 150 days to complete their nesting cycle. Depending on whether the site is in northern, central or southern Florida, the nesting season will span approximately 150 days between the first of December and the end of August).

Objective: To avoid impacts to nesting wood storks and protect water quality of adjacent foraging areas.

Exception: An exception may be granted if an off-site compensation or on-site mitigation plan has been approved by the USFWS and the FGFWFC.

Modification: None

Waiver: This stipulation will be waived if no evidence of wood stork nesting is found on or within 2,500 feet of the tract.

Controlled Surface Use Stipulations

Florida panther

Stipulation: All new or improved roads longer than one-fourth mile in areas known or expected to support Florida panthers will be gated and closed to all unauthorized vehicular travel for the duration of the exploration and production activities.

Objective: To reduce impacts to the Florida panther from unauthorized use of roads constructed or improved for mineral exploration or development.

Exception: An exception may be granted if adjacent land use or land cover types preclude use of the area by panthers.

Modification: None

Waiver: None

Gopher tortoise, gopher frog, sand skink, mole skink, and other gopher tortoise commensals

Stipulation: In the following habitat types BLM-approved surveys for suitable gopher tortoise and commensal species will be required prior to any surface disturbance:

- Coastal Strand
- Pinelands
- Sandhills
- Sand Pine Scrub
- Mixed Hardwood Pine Forests
- Xeric Oak Scrub

No surface disturbance will be permitted within 50 meters of an active or inactive burrow or within areas of 25 acres or more with tortoise densities higher than 0.8 per acre.

Exception: Surface disturbance may be permitted within 50 meters of a gopher tortoise burrow or within areas with densities higher than 0.8 tortoises per acre, if the project is covered by a relocation and compensation plan developed in coordination with the USFWS, and the FGFWFC and/or other state agencies.

Modification: Survey requirements may be modified if current tortoise wildlife surveys of the tract meet with BLM's approval.

Waiver: This stipulation will be waived if gopher tortoise habitat is found not to exist on the tract.

Groundwater No. 1

Stipulation: Closed mud systems are required for drilling operations on the following soil mapping units, as delineated on the referenced maps¹:

- Lakeland-Eustis-Lakewood
- Klej-Leon
- Huckabee-Kalmia-Izagora
- Chipley-Scranton
- Johns-Leaf
- Chipley-Albany-Leon
- Ardilla-Leefield-Stilson

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Objective: To protect groundwater resources in areas not favorable for construction of reserve pits. Limiting characteristics include excessive seepage and/or high water table.

Exception: Written requests for exceptions to allow reserve pits on specific sites will be considered. An exception will be granted if inspection and analysis shows that the limiting characteristics of the stipulated soil mapping units do not exist on the site(s), and conditions are found to be favorable for construction of a reserve pit.

Modification: None

Waiver: Written requests for a waiver of this stipulation will be considered. A waiver will be granted if inspection and analysis shows that the limiting characteristics of the stipulated soil mapping units do not exist on the lease, and conditions are found to be favorable for construction of reserve pits.

Groundwater No. 2

Stipulation: Either a closed mud system or lined reserve pit will be required for drilling operations on the following soil mapping units. The determination will be based on site-specific inspection and analysis. The soil mapping units are delineated on the referenced maps¹:

Lakeland, Ruston, and Norfolk-Sunsweet,
Carnegie, and Cuthbert
Norfolk-Ruston-Savannah
Tifton-Irvington-Lynchburg
Lakeland-Troup
Dothan-Orangeburg
Fuquay-Lucy-Troup
Dothan-Orangeburg-Tifton
Lakeland-Faceville

Objective: To protect groundwater resources. Limiting characteristics may include excessive seepage and/or high water table.

Exception: None

Modification: None

Waiver: None

Groundwater No. 3

Stipulation: Lined reserve pits are required as a minimum standard for drilling operations on the following soil mapping units, as delineated on the referenced maps¹:

Red Bay-Blakely
Tifton-Carnegie-Faceville
Troup-Orangeburg
Red Bay-Lucy

Objective: To protect groundwater resources. Limiting characteristics may include moderate seepage.

Exception: None

Modification: None

Waiver: None

Lease Notices

Notices are attached to leases to inform the lessee of restrictions that may apply because of law, regulations, standard lease terms, or onshore oil and gas orders. Lease notices alone do not involve new restrictions or requirements, but may assist the lessee in submitting acceptable surface use plans.

The following notice will be applied to all new leases within areas identified as habitat for plant species which are federally listed or candidates for federal listing, and/or are listed by the state of Florida as endangered, threatened or a species of concern. The species and applicable areas will include those identified in Appendix I.

Lease Notice

Protection of Sensitive Plant Species

The leased lands may contain habitat suitable for the occurrence of the following species which are federally listed or candidates for federal listing, and/or are listed by the state of Florida as endangered, threatened, or a species of concern:

(Species listed include those potentially occurring in the lease area as identified in Appendix I)

All viable habitat will be identified during environmental review of the proposed surface use

program. If field examination indicates that habitat of one or more of these species is present, BLM will determine whether or not the species would be affected by the proposed activity. If the species would be affected, conference and/or consultation with FGFWFC and the USFWS would be undertaken as appropriate in accordance with BLM Manual 6840. This may require additional time to process the lessee's/operator's proposal, and may result in restrictions to the proposed operations, including denial of surface disturbance in habitat areas or requirements to compensate for habitat loss.

¹ Names of Source Maps:

Florida Ecological Atlas, Map C1, Bay Minette, Soil and Landforms, produced by U.S. Fish and Wildlife Service and Minerals Management Service, 1984.

Florida Ecological Atlas, Map C2, Pensacola, Soil and Landforms, produced by U.S. Fish and Wildlife Service and Minerals Management Service, 1984.

Florida Ecological Atlas, Map C3, Crestview, Soil and Landforms, produced by U.S. Fish and Wildlife Service and Minerals Management Service, 1984.

Florida Ecological Atlas, Map C4, Fort Walton Beach, Soil and Landforms, produced by U.S. Fish and Wildlife Service and Minerals Management Service, 1984.

